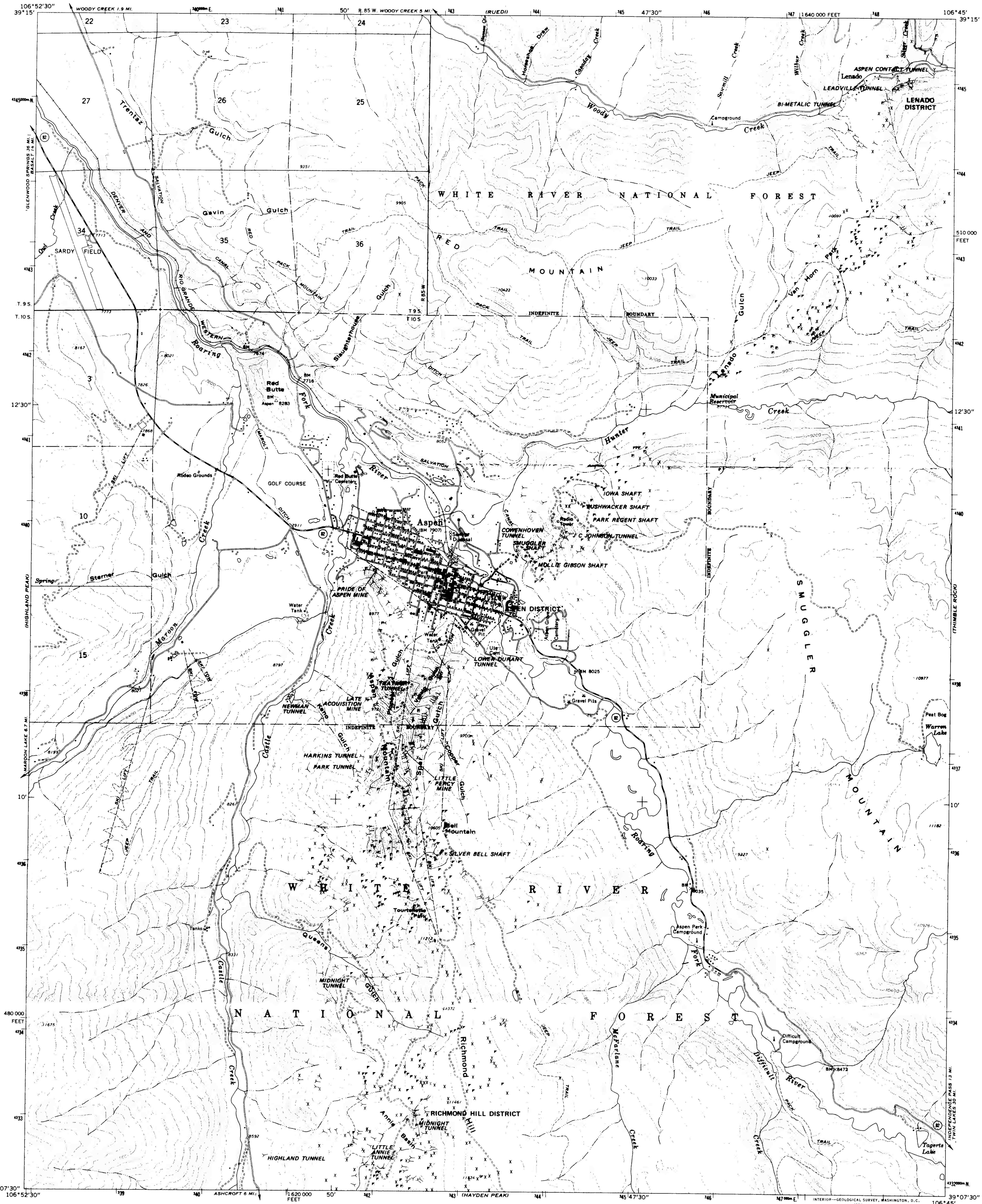
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



Base from U.S. Geological Survey, 1960
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 13

APPROXIMATE MEAN DECLINATION, 1972

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

MAP SHOWING MINES, PROSPECTS, AND AREAS OF SIGNIFICANT SILVER, LEAD, AND ZINC PRODUCTION IN THE ASPEN QUADRANGLE, PITKIN COUNTY, COLORADO

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EXPLANATION

Area of significant silver, lead, and zinc production

Shaft

Adit

Prospect

NOTES

This map shows the prospects, adits, and shafts visited during geologic fieldwork in the Aspen quadrangle (Bryant, 1971). A few important mines have been obliterated in the grading of ski trails on Aspen Mountain, and a few others were not visited. The distribution of prospects clearly depicts the potentially favorable area for metallic deposits in the quadrangle. Much of the prospecting was done in the 1880's, but some relatively large tunnels, especially near Richmond Hill, were driven in the 1920's. In the 1960's the Highland tunnel was lengthened to more than a mile, and trenching and drilling were done in the Annie Basin and Lenado areas.

The history of metal production in Pitkin County is shown in figures 1 through 3, compiled from the Minerals Yearbooks of the U.S. Bureau of Mines and from Henderson (1926). Production from mines in the county outside the Aspen 7½-minute quadrangle has been small, so the figures for the whole county give a valid general view of metal production for the quadrangle. Production has totaled 10,311,000 ounces of silver, 294,000 tons of lead, and 11,000 tons of zinc; the total value of production in terms of 1972 metal prices is about 240 million dollars. Since 1952 almost no mining has been done in the Aspen quadrangle.

Most of the productive ore deposits are concentrated in the Belden Formation and the Leadville Limestone in or near fault or fracture zones, especially where two or more such zones intersect or where a zone intersects a favorable stratigraphic horizon. In the Aspen quadrangle the two principal favorable horizons are (1) on Aspen Mountain, the contact between the dolomite of the lower part of the Leadville and the overlying relatively massive limestone, and (2) on Smuggler Mountain, the contact between the Belden Formation and the Leadville. In detail, the relations between rock types, structural features, and ore are complex, and in places faults are parallel to bedding at these stratigraphic horizons. In the 1880's and early 1890's there was extensive litigation on the question of whether the primary control of the ore bodies was the bedding of the sedimentary rocks or the crosscutting faults. The legal problem arose because of the "apex law," which permitted the owner of the outcrop of a vein to follow it downdip beyond the vertical sidelines of his claim into adjacent claims. For a summary of the litigation see Spurr (1898, p. XXI-XXV in introduction by S. F. Emmons). See also the other references below dating from the 1880's.

Extensive descriptions of the mine workings, which are now mainly inaccessible, are given by Spurr (1898) and are valuable to anyone interested in the geology or ore deposits of the Aspen quadrangle. Henrich (1888), Brunton (1888), and Knopf (1926) also record observations from underground workings.

Relatively few data are available concerning metal resources remaining in the ground in the Aspen quadrangle. Low-grade lead-zinc ore apparently remains between the old workings and in some dumps (Heyl, 1964, p. 26-28, 60-62). Drilling by the U.S. Bureau of Mines in the old workings on Smuggler Mountain revealed intervals of several tens of feet of rock containing 2-5 percent combined lead and zinc. Flotation concentration tests of this ore were unsuccessful (Volin and Hild, 1950). Some richer ore may exist below the old workings, but maps of the workings show fewer stopes on the deeper levels, which probably indicates that rich ore was not as widespread there as nearer the surface. Another important factor in the cessation of deep mining at Aspen was the difficulty of coping with the large volume of water which came into the workings below the level of the Roaring Fork River. Volin and Hild (1950, p. 4) report that 3,250 gallons per minute was pumped from the deeper levels beneath Smuggler Mountain in 1918, when they were last worked.

The following minerals have been reported from veins and ore deposits in the Aspen quadrangle, and many of them may be found in the dumps and prospect pits.

Pearceite, argentite, tetrahedrite, tennantite, galena, sphalerite, pyrite, chalcopyrite, bornite, chalcocite, covellite, pyrargyrite, polybasite, native silver, barite, gypsum, epsomite goslanite, anglesite, wurtzite, calcite, dolomite, siderite, aragonite, cerussite, smithsonite, azurite, malachite, hematite, limonite; chrysocolla, tourmaline, and quartz.

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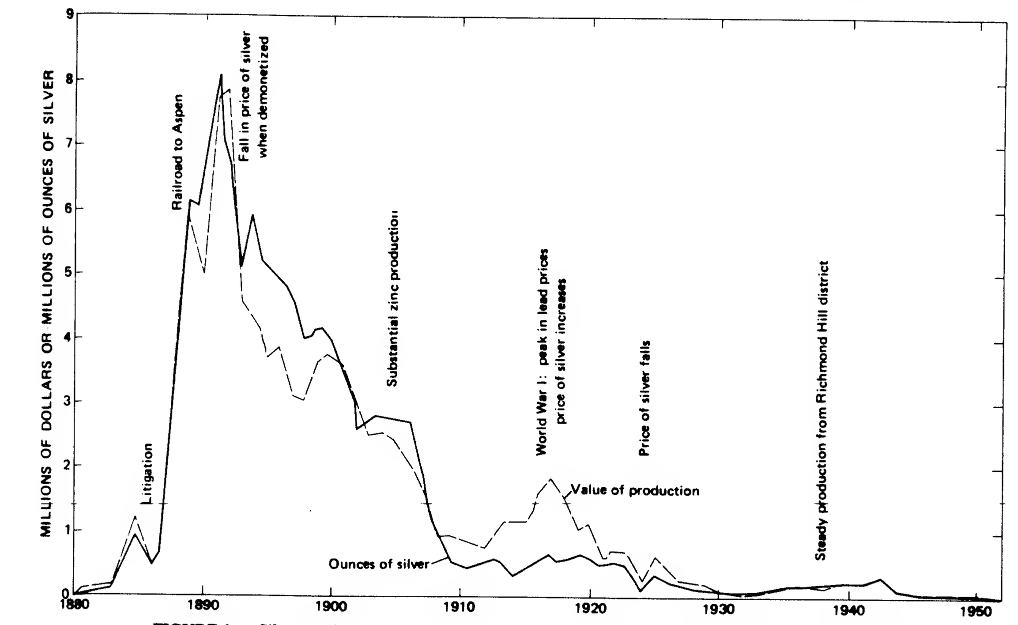

FIGURE 1. – Silver production and value of total metal production in the Aspen quadrangle, 1880-1952

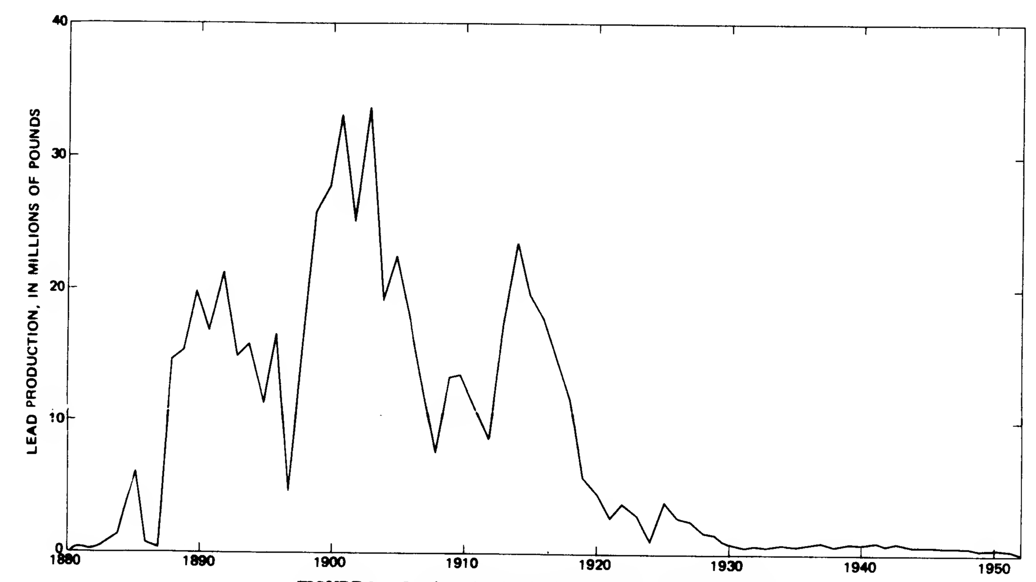

FIGURE 2. – Lead production in the Aspen quadrangle, 1880-1952

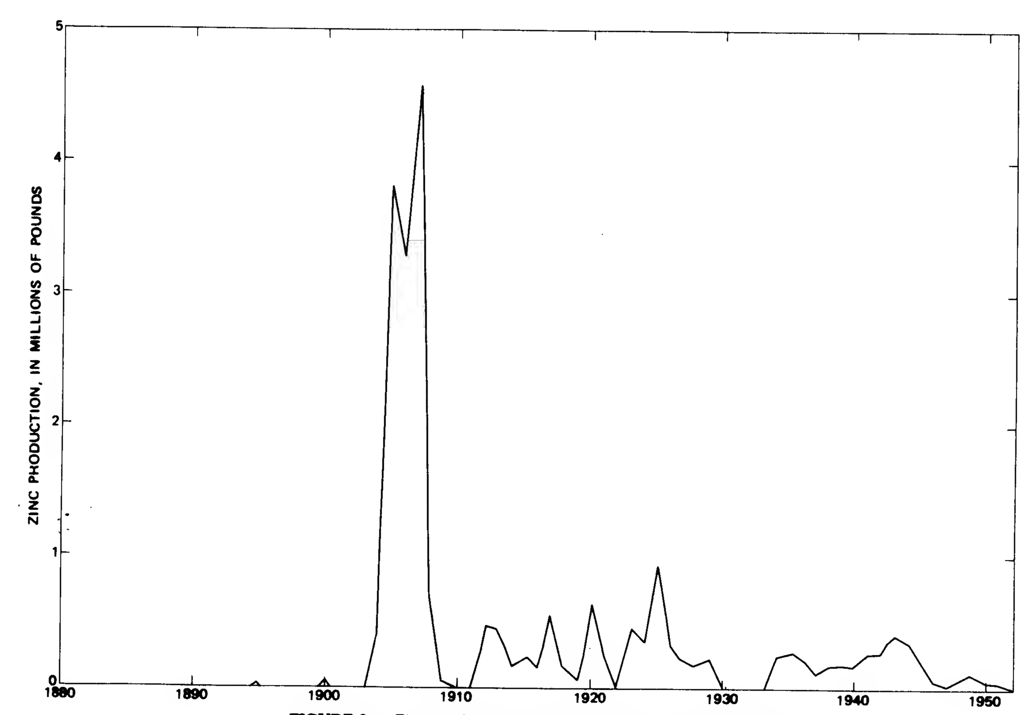

FIGURE 3. – Zinc production in the Aspen quadrangle, 1880-1952
Note that the scale showing amount of zinc production is one-tenth that of figure 2